THE INVENTION CLAIMED IS

1. An autonomous monitoring apparatus for monitoring air, water, soil, or other substance for bioagents, comprising:

a collector for gathering said air, water, soil, or other substance being monitored, said collector separating selected potential bioagent particles from said air, water, soil, or other substance;

sample preparation means for preparing a sample of said selected potential bioagent particles, said sample preparation means operatively connected to said collector for preparing said sample from said air, water, soil, or other substance gathered by said collector; and

a detector for detecting said bioagents in said sample, said detector operatively connected to said sample preparation means.

2. The apparatus of claim 1 wherein said collector is an aerosol collector.

3. The apparatus of claim 1 wherein said air, water, soil, or other substance includes other particles in addition to said potential bioagent particles and wherein said collector includes separator means for separating said potential bioagent particles from said other particles.

4. The apparatus of claim 3 wherein said potential bioagent particles are of a predetermined size range and said separator separates said potential bioagent particles are of a predetermined size range from said other particles.

5. The apparatus of claim 4 wherein said collector is an aerosol collector that collects air and includes means for separating said air into a bypass air flow that does not contain said potential bioagent particles of a predetermined particle size range and a product air flow that contains said potential bioagent particles of a predetermined particle size range.

6. The apparatus of claim 5 wherein said collector includes a wetted-wall cyclone collector that receives said product air flow and traps and concentrates said potential bioagent particles of a predetermined particle size range in a liquid.

7. The apparatus of claim 1 including a computer and wherein said sample preparation means is controlled by said computer.

8. The apparatus of claim 1 wherein said sample preparation means is a means for providing an immunoassays sample.

9. The apparatus of claim 1 wherein said sample preparation means is a means for providing a nucleic acid assays sample.

10. The apparatus of claim 1 wherein said sample preparation means includes means for concentrating said air, water, soil, or other substance.

11. The apparatus of claim 1 wherein said sample preparation means includes means for purificating said air, water, soil, or other substance.

12. The apparatus of claim 1 wherein said sample preparation means includes means for lysis of spores in said air, water, soil, or other substance.

13. The apparatus of claim 1 wherein said sample preparation means includes means for mixing said air, water, soil, or other substance.

14. The apparatus of claim 1 wherein said sample preparation means includes means for injecting and/or aspirating a sample, means for adding a reagent to said sample, means for mixing said sample and said reagent, and means for transporting said sample and said reagent.

15. The apparatus of claim 14 wherein said means for injecting and/or aspirating said sample comprises a sequential injection analysis system.

16. The apparatus of claim 14 wherein said means for injecting and/or aspirating said sample comprises a flow injection analysis system.

17. The apparatus of claim 14 wherein said means for adding a reagent to said sample includes an injection valve.

18. The apparatus of claim 14 wherein said means for adding a reagent to said sample includes a multi position selection valve.

19. The apparatus of claim 14 wherein said means for mixing said sample and the reagent includes a super serpentine reactor.

20. The apparatus of claim 14 wherein said means for transporting said sample and said reagent is operatively connected to said means for mixing said sample and said reagent.

21. The apparatus of claim 1 wherein said detector is a liquid-array based multiplex immunoassay detector.

22. The apparatus of claim 21 wherein said liquid-array based multiplex immunoassay detector utilizes optically encoded microbeads.

23. The apparatus of claim 22 wherein said optically encoded microbeads are coded with antibodies.

24. The apparatus of claim 22 wherein said optically encoded microbeads are coded with fluorescently labeled antibodies.

25. The apparatus of claim 22 wherein said optically encoded microbeads are color coded.

26. The apparatus of claim 22 wherein said optically encoded microbeads are color coded with color emitting dyes.

27. The apparatus of claim 22 wherein said optically encoded microbeads are small diameter polystyrene beads.

28. The apparatus of claim 22 wherein said optically encoded microbeads are imbedded with precise ratios of red and orange fluorescent dyes yielding an array of beads, each with a unique spectral address and each bead is coated with capture antibodies specific for a given antigen.

29. The apparatus of claim 22 including a flow cytometer for analyzing said optically encoded microbeads.

30. The apparatus of claim 29 wherein said optically encoded microbeads are optically encoded and fluorescently-labeled microbeads and wherein said microbeads are individually interrogated by said flow cytometer.

31. The apparatus of claim 1 wherein said detector is a multiplex immunoassay detector.

32. The apparatus of claim 1 wherein said detector is a multiplex PCR detector.

33. The apparatus of claim 1 including confirmation means for confirming said bioagents in said sample.

34. The apparatus of claim 33 wherein said confirmation means is a multiplex immunoassay detector.

35. The apparatus of claim 33 wherein said confirmation means is a multiplex PCR detector.

36. The apparatus of claim 33 wherein said confirmation means is a real time PCR detector.

37. The apparatus of claim 33 wherein said confirmation means includes means for performing PCR amplification.

38. The apparatus of claim 33 wherein said confirmation means includes means for injecting/aspirating a sample, means for adding PCR reagent, means for mixing sample and reagent, means for transport to PCR reactor, means for performing PCR amplification, means for transport of amplified sample from PCR reactor, and means for detection of PCR amplicon.

39. The apparatus of claim 33 wherein said confirmation means includes means for injecting/aspirating a sample, means for adding PCR reagent, means for mixing sample and reagent, means for transport to PCR reactor, means for performing PCR amplification, means for transport of amplified sample from PCR reactor, means for detection of PCR amplicon, and means for decontamination and conditioning of all exposed conduits.

40. The apparatus of claim 1 wherein said sample preparation means includes optically encoded microbeads and bead suspension/mixer means for suspending said microbeads for a predetermined time period.

41. A method of monitoring air, water, soil, or other substance for bioagents, said air, water, soil, or other substance containing potential bioagent particles of various sizes, comprising the steps of:

gathering said air, water, soil, or other substance containing potential bioagent particles of various sizes;

separating said potential bioagent particles by size and collecting said potential bioagent particles of a size range that are likely to contain said bioagents; and

detecting said bioagents in said potential bioagent particles of a size range that are likely to contain said bioagents.

42. The method of claim 41 wherein said step of separating said potential bioagent particles by size and collecting said potential bioagent particles of a size range that are likely to contain said bioagents comprises separating said air into a bypass air flow that does not contain said potential bioagent particles of a size range that are likely to contain said bioagents and a product air flow that does

contain said potential bioagent particles of a size range that are likely to contain said bioagents.

43. The method of claim 41 wherein said step of separating said potential bioagent particles by size and collecting said potential bioagent particles of a size range that are likely to contain said bioagents includes the step of concentrating said potential bioagent particles of a size range that are likely to contain said bioagents in a liquid.

44. The method of claim 41 wherein said step of detecting said bioagents comprises mixing optically encoded microbeads with said potential bioagent particles and detecting said bioagents with said optically encoded microbeads.

45. The method of claim 41 wherein said step of detecting said bioagents comprises mixing optically encoded microbeads coded with antibodies with said potential bioagent particles and detecting said bioagents with said and detecting said bioagents with said optically encoded microbeads coded with antibodies.

46. The method of claim 41 wherein said step of detecting said bioagents comprises mixing optically encoded microbeads coded with fluorescently labeled antibodies with said potential bioagent particles and detecting said bioagents with said and detecting said bioagents with said optically encoded microbeads coded with fluorescently labeled antibodies.

47. The method of claim 41 wherein said step of detecting said bioagents comprises mixing optically encoded microbeads color coded with color emitting dyes with said potential bioagent particles and detecting said bioagents with said optically encoded microbeads.

48. The method of claim 41 wherein said step of detecting said bioagents comprises mixing optically encoded microbeads with said potential bioagent particles and analyzing said optically encoded microbeads in a flow cytometer.

49. The method of claim 41 including the step of confirming said bioagents.

50. The method of claim 41 including the step of confirming said bioagents by adding PCR reagent to said potential bioagent particles, performing PCR amplification on said potential bioagent particles, and detecting PCR amplicon in said potential bioagent particles.